Research Edition 2018

WESTERN MICHIGAN UNIVERSITY

W Magazine

Tracking songbirds and other research pursuits—
Mentoring young learners in the field of discovery

Also inside

Promising research could lead to glaucoma treatment

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Guided by world-class faculty scholars, WMU students are engaged in research that adds new knowledge and unique value to the world.

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Frequency

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Correction: A notice in the spring edition gave an incorrect date of death for Laurel A. Grotzinger, professor emerita of University Libraries, who died Dec. 15, 2017.

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What's the buzz?

This insect motel is one of the many places nature is at home at the Gibbs House, a laboratory for sustainable living, learning and research on the University's Parkview Campus. The constructed dwelling is designed to offer habitat to native insects, particularly pollinators. The accommodations attract bees that, unlike the common honeybee, do not live in a hive.

Dear Friends,

In this issue of the ***W Magazine***, we are giving you a view into undergraduate engagement in WMU's research mission, which provides our students with meaningful opportunities to use the knowledge they acquire in the classroom to create new knowledge and to add value through their creative activities, guided by our world-class faculty scholars.

The beauty of this academic enterprise is that as students learn how to conduct research, discovery and creative activities and as professors engage their students' curiosity, harness their students' abilities to learn and nurture their developing skills in the pursuit of scholarly projects, the world gets better in the process.

Research at WMU is uncovering methods to spur the regeneration of adult nerve cells, which has untold implications for fighting diseases such as glaucoma, currently an incurable condition.

Biologists are studying human encroachment into animal habitats and how this may be impacting and changing the natural world.

WMU researchers also are devising ways to more effectively design buildings to withstand the planet's increasingly extreme weather events caused by climate change.

And because of our expertise in audiology, U.S. military personnel will be better protected against hearing damage in the presence of artillery fire in the future.

All of these ventures designed to meet society's disparate needs are underway at WMU, along with numerous others. We take pride in the fact that our students are not mere observers to these endeavors; in many cases, they are engaged in them.

As a result, our rising scholars are developing a deep appreciation for the power of inquiry and the rewards of discovery. And, importantly, they are learning that those rewards extend to the world around them. By the time they leave WMU, learning objectives achieved, they will be well-equipped as the next leaders to pursue the discoveries that are sure to benefit the world. Together with our talented faculty, they represent the best of what higher education has to offer.

Best wishes,

Edward Montgomery, Ph.D.
President

Terri Goss Kinzy, Ph.D.
Vice President for Research

Jazz students continue winning ways in DownBeat competition

Jazz studies students and their instructors are upbeat after again earning multiple wins in *DownBeat* magazine's 41st annual Student Music Awards.

In what is regarded as the most comprehensive competition for collegiate jazz programs, WMU students earned two awards, placing among the top 10 finishers in the international music competition. No other Michigan universities brought home an award.

The two wins meant WMU tied with many major institutions for the most awards, including the Oberlin Conservatory, Manhattan School of Music, New York University and the New England Conservatory.

The *DownBeat* awards continue to be the most thorough and publicized metric for jazz programs across the globe.

"WMU's jazz studies program has been earning awards in *DownBeat's* Student Music Awards for more than 25 consecutive years, and multiple awards for two decades," says Tom Knific, professor of music and director of the University's jazz studies program. "Our institutional historic total is nearly 170. We're especially proud of this year's winners, as they were also among our four winners in last year's competition."

This year's honorees, along with the category of their award and professor, are:

• Lushh; Blues/Pop/Rock Group; Graduate College Winner; ensemble members, Eddie Codrington, Matthew J. Epperson, Madison George, Grayson Nye and Andrew Saliba, with Yakiv Tsvietinskyi; and professor, Keith Hall.

• Andrew Saliba—"Silent Minority"; Original Composition-Small Ensemble; Undergraduate College Outstanding Compositions; professor, Andrew Rathbun.

To learn more about WMU's jazz studies program, visit wmich.edu/jazz. ■

Bott

Kinzy

McCorkle

Proudfoot

WMU welcomes four new vice presidents in key areas

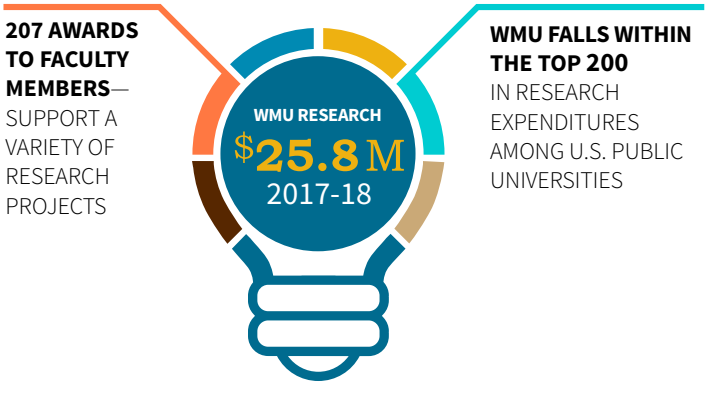
As part of a transformative period in WMU's modern history, the University starts the coming academic year with four new vice presidents. Each senior leader was selected through a national search process.

Dr. Jennifer Bott was named provost and vice president for academic affairs in May. The University's new chief academic officer comes to WMU from Ball State University, where she was the Bryan Dean of the Miller College of Business. Long experienced in higher education leadership, Bott brings a wealth of experience in strategic planning, program development, budgeting, shared governance, fundraising and growing enrollment.

Dr. Terri Goss Kinzy joined campus as the new vice president for research in January. She was previously vice president for research at Rutgers University, where she also was a professor of biochemistry and molecular biology and pediatrics. In addition to leading university research operations, Kinzy's own research is in the areas of gene expression, protein synthesis and drug development, garnering grants from the National Institutes of Health, the National Science Foundation and other agencies.

The University also welcomed a new vice president for diversity and inclusion in August. Dr. Candy McCorkle was previously director of diversity and inclusion at Alma College in Alma, Michigan. She comes to WMU experienced in developing programming to promote diversity and inclusion on campus; facilitating diversity education for faculty, staff and students; and collaborating with the administration to create policies and practices that foster inclusiveness.

In June, Tony Proudfoot joined campus to fill a newly created position—vice president for marketing and strategic communication. Proudfoot previously led marketing at the University of Arizona. He brings to WMU a strong track record of success in university marketing, brand positioning and communication leading to increases in enrollment, student retention, graduation rates and philanthropic support. ■


207 AWARDS TO FACULTY MEMBERS— SUPPORT A VARIETY OF RESEARCH PROJECTS
WMU RESEARCH
$25.8 M
2017-18
WMU FALLS WITHIN THE TOP 200 IN RESEARCH EXPENDITURES AMONG U.S. PUBLIC UNIVERSITIES

Integrated supply management program among top 10 in the nation

WMU's integrated supply management program recently ranked No. 8 on national researcher Gartner's list of Top U.S. Supply Chain Undergraduate Programs. This distinction places it within the top tier of programs nationwide and is the third consecutive time WMU's program cracked the top 10 for this list.

WMU's high standing on the list places the University among other elite programs, including at Michigan State, Rutgers and Pennsylvania State universities. The ranking is released biennially and considers a supply chain program's scope—its industry value as a highly recruited school, whether students have a broad understanding of industry concepts and program size. The 2018 ranking serves to solidify the strength of WMU's program, which was one of only three to be ranked in all three evaluation categories.

"Gartner's report is a result of what employers view as the perfect job candidate. The overwhelming answer was a blend of engineering, business and information technology skill sets," says Dr. Sime Curkovic, WMU professor of supply chain management. "We have been and will continue to be a program that gives employers exactly what they need."

WMU's integrated supply management program has been recognized nationally by several organizations and publications for its leadership in preparing students for careers in supply chain management. The program also includes Bronco Force consulting teams, which give students experience in business consulting with companies on their supply chain challenges.

To learn more about the program, visit wmich.edu/supplychain. ■

Left to right, Lauren Quandt, Shelby Satkowiak and Kelly Erdmann

Aviation team places first among collegiate competitors

Three WMU aviators—Lauren Quandt, Shelby Satkowiak and Kelly Erdmann—captured first place in the collegiate division and fifth place overall in the women-only Air Race Classic cross-country flying event in June.

They finished the more than 2,600-mile course June 19-22 against an aircraft-specific handicap, rather than head-to-head against other competitors.

Last year, WMU ranked fifth in the collegiate race and 10th overall. The University first entered a team in 2000 and raced every year through 2008, returning to the competition in 2014. The first and only other time a WMU team placed in the top spot for the collegiate division was 2005 when it also placed eighth overall.

The 2018 race followed a zigzag route that started in Sweetwater, Texas, and ended in Fryeburg, Maine. Of the 52 teams and more than 100 women of all ages competing, 20 teams this year represented 17 aviation colleges around the nation.

The Air Race Classic, part of a long tradition of women's air races, dates back to the days of Amelia Earhart and each year features women pilots from across the nation flying fixed-wing aircraft. Air racing became popular in the 1920s, but women pilots were forbidden to race against men, so they started their own race. The high-profile race is billed as "the only all-woman, cross-country event." ■

WMU becomes part of national student mental health effort

WMU has completed its initial membership steps to become a JED Campus, putting a campuswide focus on student well-being and mental health. The University is now one of nearly 200 campuses across the country enrolled in the four-year-old national initiative that serves more than 2 million college students.

Success at WMU

The JED Campus program is designed to increase student resilience and decrease the two leading causes of death among young adults—accidents, including those caused by prescription drug overdoses or alcohol poisoning, and suicide.

To begin assessing the match between WMU's level of services and the mental health needs of its students, the University took part in a "Healthy Minds Study" during the spring semester as well as a baseline assessment of services. Through the online survey administered in April, some 4,000 WMU students were asked to share their attitudes, behaviors and awareness of mental health issues.

Becoming a JED Campus was the focus of a single submission in a call for transformational ideas issued last fall by WMU President Edward Montgomery. Several of the more than 60 ideas submitted for funding, including the JED Campus proposal, ultimately became part of one major campus initiative called Success at WMU. Preparations have been underway since January to welcome all new students to campus this fall with a solid program in place to ensure academic success. The program includes a peer mentor for every incoming student to provide new students with a strong and early connection to the University.

Dr. Gary H. Bischof, dean of WMU's Lee Honors College, is the University's point person on the JED Campus portion of the Success at WMU initiative. He says WMU's entry into the JED effort makes it one of 15 Michigan colleges and universities that will operate in the JED program as a Michigan cohort, and the institutions involved will gather periodically to share resources and effective practices. WMU's four-year commitment to the program, he says, will revolve around student awareness of the help that is available to them. ■

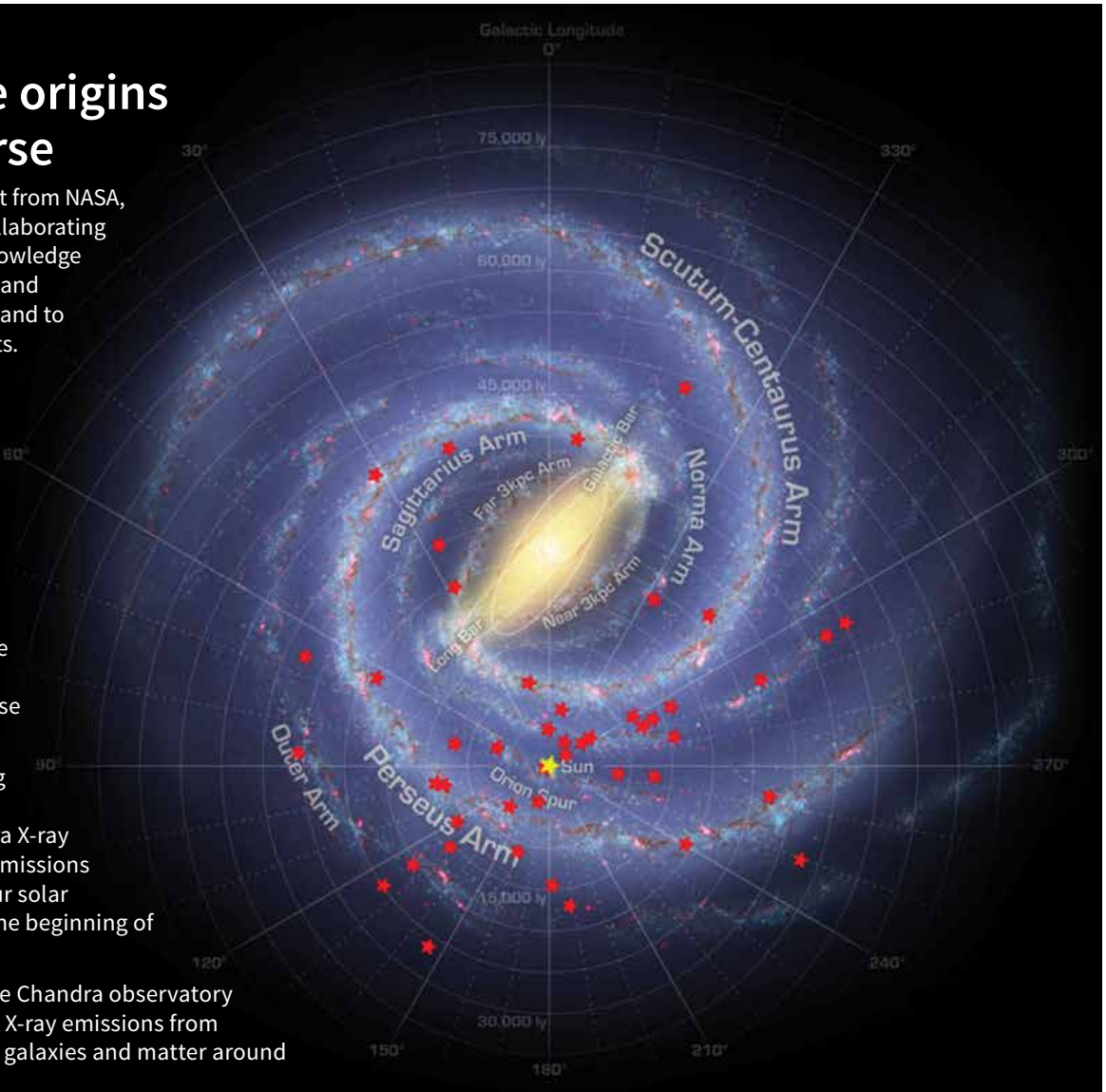
Pursuing the origins of the universe

Funded by a $500,000 grant from NASA, two WMU physicists are collaborating on a project to advance knowledge about the origin, structure and evolution of the universe—and to search for Earth-like planets.

Through their theoretical atomic and molecular physics research, Drs. Thomas Gorczyca and Manuel Bautista, are helping to answer key questions in astrophysics: Where is oxygen, silicon and iron found in the universe? And what are the abundances and physical and chemical forms of these elements?

The scientists, interpreting data collected by a NASA satellite called the Chandra X-ray Observatory, study X-ray emissions that come from outside our solar system and date back to the beginning of the big bang.

Aiming in all directions, the Chandra observatory orbits the Earth, detecting X-ray emissions from exploded stars, clusters of galaxies and matter around black holes.



Those emissions pass through what astronomers call the interstellar medium—the intervening space and matter between celestial objects—such as stars, quasars, galaxies—and the Earth. The matter in the interstellar medium is primarily composed of dust and gas, with detectable levels of oxygen, hydrogen and other elements.

Bautista and Gorczyca, along with graduate student researchers, are using theoretical methods and computational approaches to help predict the abundances of elements in X-ray emissions.

What they learn from this radiation from distant regions may provide insights into how the Earth and its solar system came into existence.

"We can't go back to when our solar system or when our Earth was formed, but we can look elsewhere and watch how other stars were formed. We're trying to look for exoplanets—planets orbiting other stars—that have the right condition for life," says Gorczyca, who specializes in theoretical atomic physics and is the principal investigator on this project with Bautista, who specializes in astrophysics.

"With the Chandra measurements and atomic data, one can start to figure out what's in the interstellar medium and at what intensity a source is emitting. It's kind of just working backward from the information you have," Gorczyca says.

"The ultimate (goal) is to understand the chemical evolution of the universe." ■

Future leaders in research start here

The word "research" in a university context may conjure images of lab-coated professors staring intently into microscopes while neophyte student lab assistants are consigned to washing beakers, uninvolved in the discovery process.

But research is as vast and diverse as the world itself, and WMU is a place where students, including undergraduates, are involved in scholarship.

Some WMU researchers study animal behavior and habitats to understand and reveal changes in the environment. Others go across seas to explore world cultures. Some may be found at bodies of water measuring the presence of contaminants. There are other faculty members whose focus is on financial markets and international trade.

And many do spend hours scrutinizing slides under microscopes to answer any number of consequential scientific questions.

Faculty take students into these various realms to learn and to contribute.

"We have really stellar faculty who have international reputations and are winning prizes for their work. But they are also very accessible," says Dr. Carla Koretsky, dean of the College of Arts and Sciences.

"They are student-focused. They wouldn't be working at Western if they weren't interested in teaching."

As a longtime geosciences researcher and someone who traces her own career back to a professor who invited her to join his lab, Koretsky, in turn, has always looked for curious, hard-working students to join her in research. She is not alone.

Many faculty members involve students in their projects, and studies have found that these experiences enrich student learning.

"I really enjoyed working with graduate and undergraduate students. And we have strong, talented and motivated undergraduates," she says. "If you take the most-talented undergraduates at Western, I would put them up against the best undergraduates at Harvard any day of the week." ■

[The mission: make discoveries, mentor talent]

Dr. Christine Byrd-Jacobs has carefully crafted a network of support for students to blossom and grow as scientists in her lab.

"My research explores the ability of the adult brain to recover from injury, using the zebrafish olfactory system as a model," says the professor of biological sciences.

"Most of the experimental techniques I use are amenable to undergraduate-level researchers. I generally use traditional techniques applied to current questions so the students can learn the scientific process. They learn by doing," she says.

Jackson Scheib and Mariam Husain are just two of the undergraduate students who work in Byrd-Jacobs' lab.

Continued on page 16

Jackson Scheib and Mariam Husain are two undergrads working in Byrd-Jacobs' lab. Husain's goal is to become a doctor. Scheib wants to pursue work in the neurosciences.

[Students aid scientists' hearing-damage research]

The work is of critical importance to the health of military personnel

Dr. Stephen Tasko is committed to engaging undergraduates in research.

But the associate professor of speech, language and hearing sciences was a little doubtful about involving undergrads in a critical and laborious project sponsored by the U.S. Army Medical Research and Matériel Command as well as the National Institute for Occupational Safety and Health.

Tasko

Along with two other hearing scientists, Drs. Kristy Deiters and Greg Flamme, Tasko is helping develop standards for noise and impulse-noise exposure.

Pursuing this project has involved hundreds of research subjects and long hours.

"I admit I was a little skeptical," Tasko recalls. "Can we train the undergraduates up? They were having to prep the skin, place sensors all over the face and place probes in ears multiple times a day."

Continued on page 24

> **"I admit I was a little skeptical. Can we train the undergraduates up? They were having to prep the skin, place sensors all over the face and place probes in ears multiple times a day."**
>
> **—Dr. Stephen Tasko, associate professor of speech, language and hearing sciences**

[Biologist earns WMU's first NSF postdoctoral research fellowship]

Dr. Erika Calvo-Ochoa is one of 40 researchers in the nation—and the first at WMU—to be awarded a prestigious National Science Foundation Postdoctoral Fellowship in biology.

With her $138,000 award, Calvo-Ochoa is studying the zebrafish olfactory bulb to understand how the brain functions and recovers from damage. Unlike humans, zebrafish can repair brain lesions through cell regeneration.

"By learning how this process works," Calvo-Ocha says, "we may be able to learn how this might work in the human brain when there is some form of traumatic brain injury" or a condition such as Alzheimer's disease.

Calvo-Ochoa

"The NSF fellowship is a tremendous opportunity for Erika," says Dr. Christine Byrd-Jacobs, professor of biological sciences and Calvo-Ochoa's faculty mentor.

Continued on page 17

On the ‘edge of the unknown’

Drs. Sharon Gill and Maarten Vonhof have developed a research program to advance their conservation-related studies while honing the skills of student researchers. Over two years, four honors students have been studying communication among field sparrows, a songbird experiencing population decline in the Midwest for as yet unknown reasons.

The students have wandered woods, faces skyward, listening to the music of the field sparrows and contemplating what the songs mean among the birds—and what studying birdsong will mean for them after finishing their undergraduate degrees.

Despite the bucolic research settings, this is hard work and long hours for the select biology majors who have labored under the guidance of two WMU researchers for the past two years.

The students have been learning the language of area songbirds, crucial fieldwork that, on top of their Lee Honors College pedigrees, will give them the best chance to pursue graduate programs.

"If I hadn't gotten experience in the lab, I probably would have changed my major or done something completely different," says Eliza Foli, a biology major who expects to graduate next spring.

Students have been recording and studying the songs of male field sparrows, seeking to understand variations in the songbirds' repertoire of songs within the species.

Why field sparrow numbers are shrinking is unresolved, but habitat loss may be a driver. And with human habitat encroachment comes human noise. Researchers are interested in the effect of this clamor on the songbirds' communication behavior, which includes songs to attract mates.

Annie Lilac, who is studying biology and environmental studies, checks a nesting box in a nature preserve.

> "If I hadn't gotten experience in the lab, I probably would have changed my major or done something completely different. I would be in no way prepared to go to grad school and do this type of thing later on."
>
> —Eliza Foli, biology major

"I would be in no way prepared to go to grad school and do this type of thing later on."

The experience is as important as the project that Foli and classmates have been working on is unique.

The field sparrow population is declining in the Midwest, down nearly 70 percent over the past three decades, according to Dr. Sharon Gill, associate professor of biological sciences, who co-runs this undergraduate field work program with Dr. Maarten Vonhof, a professor of biological sciences and of environment and sustainability.

The reason or reasons behind the decline are unclear, but a changing environment and habitat loss may be drivers. And as humans increasingly encroach on the sparrows' habitat, so does the noise that comes with people. Ultimately, Gill and Vonhof are interested in the impact of this man-made noise on the birds' communication behavior.

But their aim is to first understand the within-species variations in the communication, in the song of field sparrows.

"Variation is the part of the story of evolution," Gill says. "Populations can evolve when variation in traits among individuals occurs, so understanding the extent of variation within populations is important for understanding the potential for evolutionary change in response to the environment."

The researchers handed the project over to their undergraduate students, who went into the field to record and study the songs of male songbirds. They found four unique songs, one of which is so rare that less than 5 percent of the birds they studied sing it.

Kelsey Cushway, a biology major with chemistry and geology minors who also will graduate next spring, has been recording songbirds in the extremes of their environments.

"Everything from a rural, middle-of-nowhere preserve to next to I-94 along the highway," she says.

The purpose is to see if the songs change and, if so, how.

"Hopefully whatever answer we get from that we will be able to use that to ask all types of other questions about what affects those differences would have for the species," as humans take up more of their space, she says.

Foli and another undergrad, Eric Branch, took the three more common songs into the

field, playing those songs back to one bird and observing behavioral responses to song types.

"That could tell us if one song type has a certain meaning," Foli says.

Another of the student researchers, senior Annie Lilac, is exploring whether the different sizes and shapes of the field sparrows' bills makes their songs higher or lower pitched, or allows for different tempos.

A biology and environmental sciences double major and chemistry minor, Lilac hopes her research experience at WMU will pave the way for future opportunities, perhaps a paid internship.

"I wanted to do (field research) since sixth grade and this project was my chance to actually get my hands on it outside the classroom.

"A lot of grad schools or other labs, they want you to have the lab experience before you come in because you know what you are doing in a lab setting," says Lilac, who expects to graduate from WMU in December and start graduate school next fall.

Vonhof says that they're working up proposals for future field and lab work, only for undergrads.

"Lots of undergrads are really hungry for this experience," he says. "That ownership can really help them develop as a researcher. … It provides them opportunity to gain skills necessary to go on to graduate school or professional school that many other students don't have the opportunity to get."

Their recent undergrad students, out in the field pursuing what will be a series of ongoing studies of these songbirds navigating a changing world, aren't an anomaly. There's a pipeline of qualified students, and plenty of conservation-related research that undergrads seem to be eager to explore.

"We want to be on the edge of the known and the unknown," Gill says. "And that's where they are." ■

Urban living—an avian refuge?

As we humans expand our concrete footprint, replacing wetlands with homes, office buildings and roadways, it could be a haven for animals.

That's a paradoxical result of urban sprawl WMU researchers may have found, at least for the songbirds studied in urban centers and parklands of the southwest quadrant of Michigan's lower peninsula.

"There's complexity that we're just starting to tease away at with this study, but the grander picture is still thinking about the concern of land use change—land use change on a broad scale," says Dr. Sharon Gill, associate professor of biological sciences.

The research of Gill, Dr. Maarten Vonhof, professor of biological sciences, and graduate student Jamie Smith was published in the journal *Parasitology Research* in December. They found lower rates of avian malaria in urban songbirds, and lesser varieties of parasites that give the birds that disease.

"That may mean that urban areas are attractive to them, a way to escape the parasitism," Vonhof says. "From the perspective of this factor, it looks like urban areas could be a refuge, essentially."

That's not all, though. Birds in rural areas, alternatively, didn't just carry avian malaria at higher rates, they carried more varieties of parasites than anyone had previously known about.

Forty-two of the 71 parasites found in this study alone were "novel lineages," Vonhof says. That means its possible there's even more parasites that haven't been discovered yet, but are able to infect birds in southwest Michigan with avian malaria.

"That is interesting on its own," he says. "It's just that nobody's looked."

This frontier of research is the essence of not just what they do here at WMU, but why. Each new finding is a new path to new areas of study, an especially timely field of research as not only will humans continue to claim more of what was the domain of the wild, but a changing climate will alter the critical wet-dry balance as well.

"For every question we answer, there are three to 10 more questions we would like the answers to after that," Vonhof says. "If we are interested in understanding how to conserve biodiversity in a rapidly changing planet, we can't only look at the big things."

Likewise, the research into the relationship between these specific birds and parasites in both urban and rural areas is nowhere near definitive or complete. It's merely an open door to a world that is, they've concluded, massively unknown and the researchers are just beginning to explore. ■

The sitting specialists

The Human Performance Institute is devoted to applied research, training and outreach in ergonomics, human factors, work design and safety. It specializes in product and safety system evaluation and design, seating and healthcare modeling.

The humble seat has come a long way in both professional and office settings, and researchers in WMU's Human Performance Institute—HPI—are taking it even further.

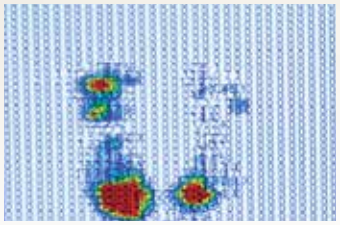
The institute is an applied research and teaching lab located in the College of Engineering and Applied Sciences in the Department of Industrial and Entrepreneurial Engineering and Engineering Management.

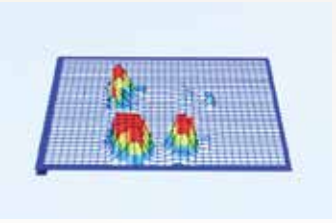
Since 2001, the lab has served as part of the research seating arm for Haworth Inc., one of the largest manufacturers and designers of office furniture and seating in the world. Applied research for other companies including both Stryker Corp. and Bronson Methodist Hospital in Kalamazoo has also taken place there over the years. The science behind the lumbar support in Zody, Haworth's bestselling office chair, was developed here.

Researchers use a host of in-house designed instruments to extract data about how different body types interact with seating. In one, a seat is outfitted with sensors that illustrate on a computer monitor the pressure points on the lumbar area of a person's back. Different sized fabric straps attached with sensors are placed on a research subjects' legs, arms, shoulders, neck, back and several other areas to determine how they move when they sit.

As the technology has become more sophisticated, and data storage more robust, the number of data points researchers in the lab can gather has exploded. For example, several million data points were used in the design of the Zody chair. But over 5 billion data points have been extracted over two years in the design of a chair still so proprietary it can't be discussed.

> “Americans are a hard population to design for because there is such variation in body type.”
>
> —Dr. Tycho Fredericks





On the far left, engineering student Kayla Burch is outfitted with sensors. Standing is Katelyn McComb, undergraduate researcher; Dr. Steven Butt, professor and chair of the Department of Industrial and Entrepreneurial Engineering and Engineering Management; and Dr. Tycho Fredericks, a professor in the department and director of the Human Performance Institute. Sitting in front of laptop computers is Megan Hammond, a doctoral student in industrial engineering.

While a subject is sitting on sensors, researchers can view the contact pressure distribution on a chair seat pan. Movement generates vastly different contact pressures, and the data collected can help with seating design, including the location of support structures and mechanisms.

“Americans are a hard population to design for because there is such variation in body type,” says Dr. Tycho Fredericks, a professor in the department whose research interests include occupational ergonomics and seating.

“We like to say ‘form follows science.’ Sure, sitting is sitting, but would you have the same seat in an office you would in a movie theatre? We try to marry use and form, with the design being driven by data.”

Fredericks, along with Dr. Steven Butt, a professor and chair of the industrial and entrepreneurial engineering and engineering management department, also have folded in many undergraduate students into their work, with over 100 undergrads assisting on a host a research projects over the past 15 years.

“We like to build on our system here, and bringing in ripe but industrious undergrads helps groom them to go to grad school while they assist us in the lab,” Butt says.

“We aren’t necessarily looking to those with a 4.0. We are looking for good students with passion who are self-directed.”

Anna Konstant was one of those students chosen to work in the lab. A recent graduate, she is returning to WMU in the fall of 2018 to pursue a master’s degree in industrial engineering.

She says her time in the lab not only provided her first-hand experience, but helped point the way forward as she honed in on her professional career track.

“The opportunity to work with Ph.D. students was awesome,” she says. “You don’t see them that often as an undergrad, so to be able to participate on research with them was a unique experience. You need experience in today’s workplace if you hope to land a job, and my time in the lab helped me find out what I want to focus on as a professional.” ■

Climate change and **construction challenges**

Researchers devise ways to advance construction industry practices in response to extreme weather

An interdisciplinary group of WMU researchers are busily studying new and creative ways to build better in an age of climate change and other global challenges facing the construction industry.

Their activities are being funded by grants from WMU's Georgeau Construction Research Center, which was established in 2016 through a $5 million gift from Phil Georgeau of Kalamazoo and his late wife, Betty.

The couple funded the center to not only advance the construction industry through innovative research, but also to create better, stronger, safer, sustainable and more resilient construction systems and materials. Housed in Floyd Hall and administered by the College of Engineering and Applied Sciences, the center already has awarded $350,000 in grants to seven projects being conducted by faculty members at the University.

In addition, construction has begun on a $1 million lab that will open this fall in the College of Engineering and Applied Sciences annex near the Kalamazoo/Battle Creek International Airport. The state-of-the-art laboratory facility will allow researchers to evaluate roofing system designs under extreme wind loads as well as study the properties of large-scale structural elements and samples under different loading conditions, including seismic loads.

Need for change

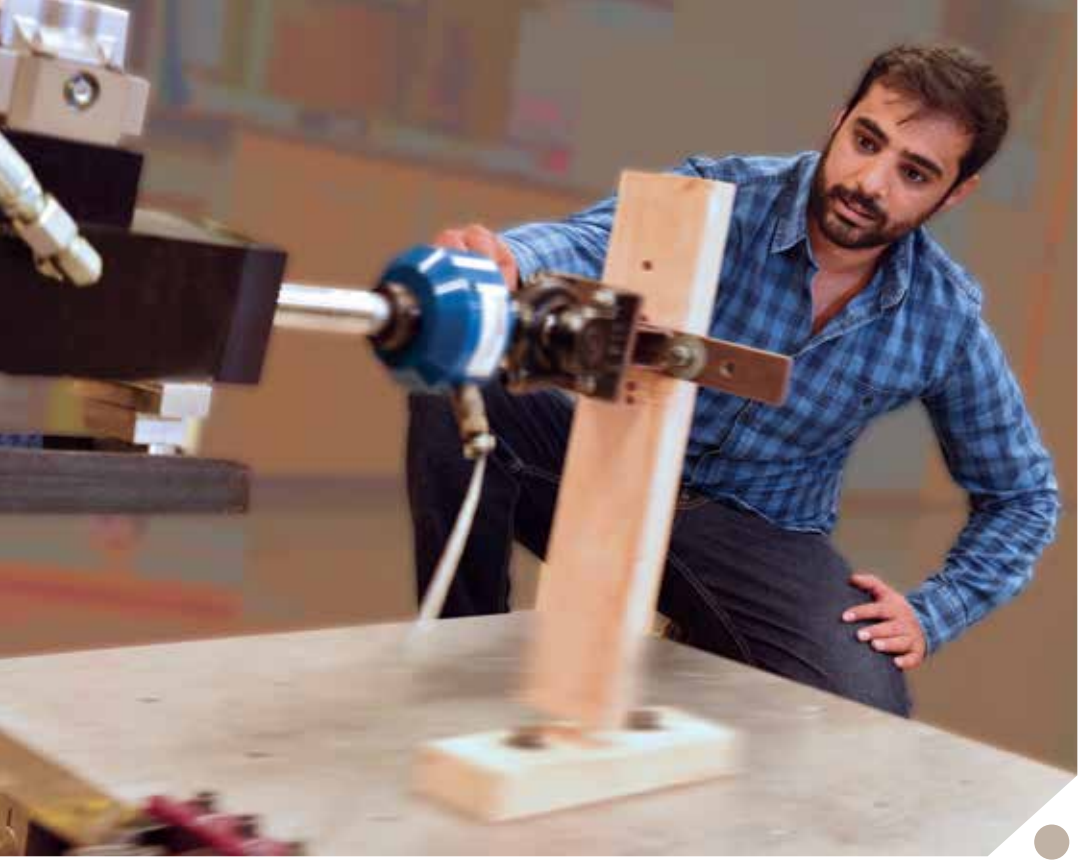
According to government figures, the construction industry contributed more than $1 trillion to America's gross domestic product and employed some 7 million people in 2017. Dr. Osama Abudayyeh, chair of the Department of Civil and Construction Engineering and founding director of the Georgeau Center, notes that it's important for this industry to remain competitive, given its huge impact on the U.S. economy.

"We're facing a host of challenges, from evolving regulatory requirements, population increases and energy shortages to air quality issues, a rising ambient temperature and more violent weather," Abudayyeh explains. "Engineers and architects have been forced to rethink traditional building codes and construction practices. It's not only sensible to change how we do things, it's become mandatory."

With that reality in mind, the Georgeau Center aims to:

- Advance the construction body of knowledge through innovative research.
- Distill research results into best practices that can be implemented by industry.
- Educate the next generation of construction researchers by engaging undergraduate and graduate students alike in the center's research.
- Transfer technology to industry through product development as well as publications, workshops and other knowledge dissemination.

"We need to adapt our materials and construction practices to new realities and we need to provide higher levels of training for construction professionals," Abudayyeh says. "The cutting-edge, forward-thinking research and training we're doing at the Georgeau Center will accomplish both."



Researchers test the structural integrity of building materials and design configurations in the Department of Civil and Construction Engineering's Laboratory of Earthquake and Structural Simulation. Graduate student Bilal Alhawamdeh is pictured demonstrating the lab's earthquake shaking table.

"We're facing a host of challenges, from evolving regulatory requirements, population increases and energy shortages to air quality issues, a rising ambient temperature and more violent weather. Engineers and architects have been forced to rethink traditional building codes and construction practices. It's not only sensible to change how we do things, it's become mandatory."

—Abudayyeh

Phil and Betty Georgeau

Phil Georgeau earned a bachelor's degree in chemistry from WMU. He went on to found Chem Link, a company based in Schoolcraft that manufactures adhesive, sealant and coating products for the construction industry that employed 104 people at the time the Georgeaus sold it in 2016.

The couple also gifted $250,000 in 2016 to the WMU Office for Sustainability to boost its studies in environmental and renewable building materials, issues that impact the Earth's survivability.

In addition, the Georgeau family established a $500,000 endowed scholarship in Betty's name to support undergraduate students pursuing engineering degrees in programs offered through the College of Engineering and Applied Sciences at WMU. Betty was a registered nurse who worked locally at Bronson Methodist Hospital for many years as well as spent 14 years with the American Red Cross.

Examples of center research

This spring, the Georgeau Center awarded continuation grants to principal investigators at WMU that build on eclectic work that the center first funded in 2017:

- Dr. Upul Attanayake, associate professor of civil and construction engineering, and Dr. William Liou, professor of mechanical and aerospace engineering received $50,000 to further Attanayake's recent evaluation of roof systems and materials for improving structural resilience in damaging winds such as tornadoes and hurricanes. That research has identified the need to develop numerical simulation expertise to assess the performance of roofing and structural systems. The continuation project includes designing a mobile outdoor experiment facility to evaluate sensors and validate numerical simulation models. It also will be used for STEM—science, technology, engineering and math—education and other outreach activities.
- Liou has built a predictive tool to simulate incidents of fire and smoke events and predict the location and likely growth of fire and smoke in smart buildings. The second phase of his research involves developing two datasets for predicting fire spread in smart buildings and then using those datasets to design an artificial intelligence-based algorithm for big data analytics for fire safety in these buildings. The nearly half million structure fires in the U.S. each year cause 17,000 injuries and deaths, and $10 billion in property losses.
- Dr. Xiaoyun Shao, associate professor of civil and construction engineering, has been studying an innovative application of construction adhesives to enhance the resilience of wood-frame buildings. With her latest grant, Shao will investigate additional novel approaches to dramatically enhance the resilience of wood-frame buildings using construction adhesives to improve strength and stiffness. Damage to those structures from earthquakes, hurricanes and other natural hazards leads to tremendous economic loss and emotional distress in North America, where wood-frame construction is predominantly used.

Learn more about the Georgeau Construction Research Center by going online to ceas.wmich.edu/georgeau/home.php. ■

[The mission: make discoveries, mentor talent] *Continued from page 7*

"I've always been interested in the brain, and I've had a lot of exposure to individuals with brains in disease states," says Scheib, who was in a branch of the military. "After I left the military, I needed a new mission, which took the form of contributing to neuroscience in some way.

"I found Dr. Byrd's lab through a friend's recommendation, and I was granted a spot as an undergrad assistant between my freshman and sophomore years," Scheib adds. "I've stayed in the lab ever since."

Byrd-Jacobs welcomes the mixture of undergraduates and graduate students in her lab.

"Undergraduate students bring an optimism and openness to the scientific process that I enjoy," she says. "They are eager to learn the process of scientific inquiry, so exposing them to real hypothesis testing is hugely beneficial to them, and I get immense satisfaction from watching them grow in this way."

Husain sees this experience as vital to her goal of attending medical school.

"Since I am pretty new to the lab, each day is a learning experience, in which one of the experienced students in the lab teaches me something, such as perfusing fish, brain dissection and making slides. Besides that, I help with the maintenance of the fish, such as cleaning tanks, filters and feeding them."

Byrd-Jacobs has a long history of mentoring students in her lab. For her, the interaction and ability to watch them grow as researchers is a singular experience.

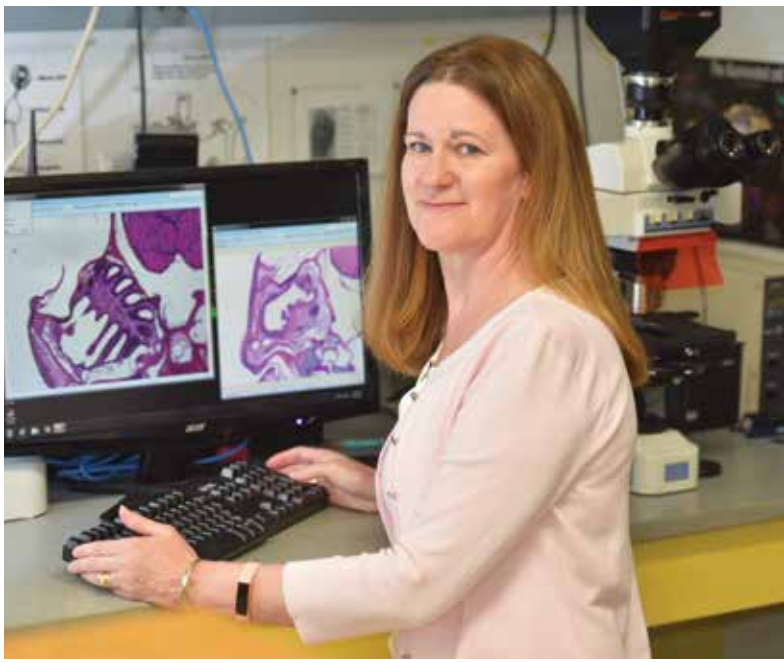
"Many of my students intend to pursue careers in the medical field. I like knowing that they will become health care professionals who will value and appreciate the basic research that contributed to the development of treatments and cures that they will use every day."

Scheib plans to pursue a doctorate in a neuroscience-related discipline and continue research in academe or in industry.

His advice to other students thinking about getting involved in research or creative work: "Ask as many questions as you can to find your niche in a field you're interested in. Once you find your hook, it stops feeling like coursework and starts to become a puzzle to solve. You can actually have an impact on how we understand the world."

From her perspective, Byrd-Jacob finds undergraduates vital to the research enterprise.

"If WMU did not encourage undergraduate research, we would miss out on the ability to create future leaders in their fields," Byrd-Jacobs says. "The faculty here know that working with undergrads in their labs is time-intensive, expensive and hard work. But most of us are at a place like WMU because we want to impact our students, and we value these interactions." ■



Dr. Christine Byrd-Jacobs

"Undergraduate students bring an optimism and openness to the scientific process that I enjoy. They are eager to learn the process of scientific inquiry, so exposing them to real hypothesis testing is hugely beneficial to them, and I get immense satisfaction from watching them grow in this way."

—Dr. Christine Byrd-Jacobs, professor of biological sciences

[Biologist earns WMU's first NSF postdoc research fellowship] *Continued from page 7*

"Erika's project will help us gain new knowledge about how the adult brain can regain function after injury. She is exploring the process of regeneration and recovery using a fish model."

Calvo-Ochoa has been interested in science and how the body works since she was a child.

"As a first grader, I remember going to my school library and finding books on the human body and cells. I would read and study those every day. I did not come from a scientific family, but I knew this was what I wanted to do."

Indeed, she's the first one on this path in many ways. She is the first person at WMU to receive the NSF research postdoc fellowship. She also is the first woman, Latina and immigrant to be so honored at the University.

"I am so humbled and grateful to the National Science Foundation and to Dr. Byrd-Jacobs for giving me this incredible opportunity," Calvo-Ochoa says. "For me, personally, it means everything. It's the chance to get back into the research lab, and it's the chance to show students from diverse backgrounds that they can be scientists, too."

> "It is important to me to be able to inspire Latinas both in the USA and in Mexico, my homeland, to work hard, to pursue their dreams and to know it is possible to be a successful Latina in STEM."
>
> —Calvo-Ochoa

At WMU, she's become an inspiring figure because of her zeal for learning, her humility and commitment to promoting diversity in STEM fields—science, technology, engineering and mathematics.

"It is important to me to be able to inspire Latinas both in the USA and in Mexico, my homeland, to work hard, to pursue their dreams and to know it is possible to be a successful Latina in STEM," Calvo-Ochoa says.

"It's not been easy. But I share that openly with my students and those I mentor, so that I can encourage them to not give up."

Her proposal includes an outreach component, and she is excited to work through existing programs at WMU, such as the College Assistance Migrant Program funded by the U.S. Department of Education, to mentor and inspire young Latino students, just as she was mentored at the Universidad Nacional Autonoma de Mexico while earning her bachelor's degree in biomedical research and her doctorate in neuroscience.

"It was very competitive and challenging, but thanks to many great mentors, I got an outstanding scientific training. I aspire to be this kind of mentor to young students to show them they can do research, too." ■

Fish tanks containing zebrafish line a counter in Byrd-Jacobs' lab.

Promising research could lead to

According to the Mayo Clinic, glaucoma is one of leading causes of blindness in the U.S. It affects nearly 3 million Americans, age 40 or older. There is no cure for glaucoma, and the medication available to patients typically only slows the progression of the disease.

Vision loss is among the top 10 disabilities worldwide. While many causes of vision loss are treatable, impaired eyesight associated with a condition called glaucoma can be resistant to treatment. In the United States, this disease of the optic nerve is one of the leading causes of blindness.

But promising research by a professor of biological sciences funded with a $450,000 National Institute of Health grant has the potential to solve the puzzle of this incurable disease—and perhaps others as well.

"Research is underway in my lab to see if there are ways to prevent neurons from dying, which is responsible for vision loss associated with several disease models," says Dr. Cindy Linn. "More importantly, with the help of this latest NIH grant, we are involved in studies that can regenerate new neurons in mammals."

Once adult mammals lose neurons, they cannot replace them. But Linn has discovered a way to artificially cause the rapid reproduction of new adult neurons in the brain.

If researchers also can cause the proliferation of adult mammalian retinal neurons, prevention or even reversal of vision loss due to disease, injury or age-related issues is possible.

"We are looking to see if we can reverse neuronal damage associated with disease models," she says. "In effect, what we have shown is that we can prevent neurons from dying and can even regenerate new ones. In our adult animal models of glaucoma, treated animals result in the generation of new neurons."

Foundations of research

Linn has dedicated her career to researching the retina and visual system. In this realm, she engages in basic research, advancing the fundamental understanding of how biological systems work and creating the foundations for innovations in applied research.

"In my doctoral studies at Rice University and early in my academic research career, I studied how normal visual processing works, analyzing the visual system in crayfish and in several lower vertebrates. I studied the interaction of nerves and the kind of information that was conveyed," she says.

"I looked at circuity—neuron-to-neuron circuitry—to understand the role of neurotransmitters and modulators for normal visual processes."

new glaucoma treatment

> **"Learning how to regenerate neurons means we might be able to reverse the effects of glaucoma, or any diseases associated with the loss of neurons, such as Alzheimer's disease."**
>
> **—Linn, on recent discoveries in her lab**

The focus shifted in 2000 when she came to WMU, where she is one of four neurobiologists. WMU offered her the opportunity to continue her collaborations with colleagues across the country in medical and optometry schools, as well as with applied scientists in industry.

"Industry research is very applied," Linn says. "My current studies are the result of research from industry that was looking for neuroprotective agents in the brain to keep neurons from dying in different diseases. Based on these studies, I began to look at what effect these neuroprotective agents might have in the retina of the eye."

An unexpected discovery

When Linn began using a new confocal microscope in her lab, researchers discovered the regenerative effect of a certain neuroprotective agent.

"We were looking at one layer of the retina where cell death typically occurs in glaucomatous retinas," she explains. "With the new microscope, when we thought we were ratcheting the objective up to remove the tissue, we were actually moving deeper into another retinal layer. It allowed us to look beyond the one layer we normally studied."

There, deeper into the cell, Linn found the unexpected. The cells were dividing mitotically, or by mitosis—a type of cell division that results in two daughter cells each having the same number and kind of chromosomes as the parent nucleus.

"It showed proliferating cells in an adult mammal's retina," Linn says.

"We are currently manipulating what the retina normally sees to cause the proliferation of new neurons. However, we have also begun to use genetics to verify our findings. We are excited about the possibilities that this next hill on the horizon of our research will bring."

Linn is collaborating with colleagues at the University of Houston College of Optometry to further advance her studies on glaucoma, hoping to see structural changes that can aid in the understanding of the pathology of the disease.

The impact of her studies is profound.

"Learning how to regenerate neurons means we might be able to reverse the effects of glaucoma or any diseases associated with the loss of neurons, such as Alzheimer's disease," she says.

Though researchers are far from using this treatment on people, discoveries thus far show promise for effective medical therapies in the future. ■

Broncos Building C·O·N·N·E·C·T·I·O·N·S

Let WMU's 'highly creative students' market your business

What if your company could hire a talented group of students with a passion for marketing, supervised by professional staff and faculty, and eager to help your business develop and execute a marketing strategy well below the price an agency would charge?

This ideal business arrangement is called BroncoConnect.

"The goal of BroncoConnect is threefold," says Lisa Garcia, director of the WMU Business Connection Office, who spearheads the operation with Dr. JoAnn Atkin, associate professor of marketing.

"We want to provide students with highly relevant marketing internship experiences, provide clients with high-quality and low-cost implementable marketing solutions and strengthen WMU's community relations in the process."

Whether they're helping to revamp a website, conducting primary or secondary research, or creating a comprehensive marketing plan, students work with Garcia and Atkin to develop solutions for established businesses, non-profits and start-ups.

In a recent project, student consultants worked with Junkless, a non-GMO snack company. The students helped Junkless formulate and execute a digital and social media plan.

"When the students first started working with Junkless, they focused on researching the target market and the company's competitors, and then formulated a digital and social strategy," Garcia says. "Once the client approved our strategy, the students began to create and post content on Junkless' social media platforms."

Kaydon Fosler, an advertising and promotion major in the Haworth School of Business says, "as an intern on the Junkless account, I have the freedom to create, photography and edit original content for social media. I also analyze the overall engagement and effectiveness of the digital advertisements I have created. Working on the Junkless account has allowed me to expand my visual marketing creativity and build a strong portfolio so that I can land a great job after graduation."

Kara Craig and Jenny Hammis, BroncoConnect team members, presented social media strategies for Junkless. Craig took photos that appeared on Junkless social media pages.

The clients realize just as many benefits as the students.

"BroncoConnect provides a very efficient marketing service alternative for smaller or startup companies," says Ernie Pang, founder of Junkless.

"With BroncoConnect, they not only offer pragmatic, strategic consultancy but also the option of marketing program execution. Given the wealth of business student talent at Haworth, they can very quickly staff projects with highly creative and energetic students seeking real-life business experience. It's a win-win. As for our line of Junkless snacks, the students managed our social media program very effectively at a fraction of the cost of a full-service agency. We have been very pleased."

> "Working on the Junkless account has allowed me to expand my visual marketing creativity and build a strong portfolio so that I can land a great job after graduation."
>
> —Kaydon Fosler, advertising and promotions major

Companies that collaborate with BroncoConnect receive services and assistance and students practice what they are learning in their courses and see how outcomes affect a company in real time.

Garcia and Atkin recruit students studying marketing, food and consumer packaged goods marketing, public relations, integrated supply management, business analytics, e-business and graphic design to bring a well-rounded team to each project.

Each project requires a different mix of student talent, and the students benefit from getting to collaborate with others outside of their major or college.

"Students work in a diverse, cross-functional team setting that gives them the opportunity to learn from each other and develop solutions that are actually implementable, not just theoretically possible," Garcia says.

And program participants have gone on to work for agencies and companies across the country, including Spotify, L'Oréal, Shift Digital and Universal McCann.

BroncoConnect has worked with a number of clients since its inception in 2013, including Gazelle Sports, Urban Alliance, WMUK, ChemLink, Experis, Southwest Michigan Black Heritage Society, Fostering Success Michigan and the Southwest Michigan Innovation Center. ■

Contact Lisa Garcia at lisa.garcia@wmich.edu to learn more about BroncoConnect.

EMPOWERING
nursing student success

Alex Mekuria was contemplating leaving school. Trying to balance a 60-hour work week with his rigorous studies as a nursing student was pushing him to a breaking point.

"I was feeling hopeless and ready to drop out," he admits.

But before he could give up, Mekuria learned about a program called Empower Success from Dr. Mary Ann Stark, professor of nursing.

"I am a hard-working individual," Mekuria says. "However, unless you get a support system, the chances to achieve your dreams and reach your goals lessen."

The Empowering Nursing Students for Success initiative, which program leaders more simply call "Empower Success," was launched last year with a $2 million grant from the U.S. Department of Health and Human Services–Health Resources and Services Administration.

The grant program is designed to provide students from diverse backgrounds academic assistance as well as peer and faculty support. The ultimate intention is to help meet the U.S. healthcare system's need for nurses in general and to help create a nurse workforce that better reflects the diversity of the patient population.

With the financial support from the grant, Mekuria was able to reduce his work-week schedule and focus more directly on his studies. And with the help of a more-experienced student, referred to as a "navigator" in the program's parlance, he learned how to prioritize, study and be better organized—basically be a better student.

A total of 10 students received scholarships and 24 were awarded stipends, with $225,000 given for student financial support. Of the 15 Empower Success Scholars who graduated last spring, all had offers of employment as professional nurses.

"The beauty of the Empower Success program is that it's changing the landscape of nursing," says Stark, principal investigator on the grant program.

"The navigators are learning from the challenges of their peers and, when one day they are colleagues, they will have a much fuller appreciation for the road traveled by their work colleagues from diverse backgrounds."

Stark

“They want to share what they are learning as they go along. This is an unintended benefit of this program. The navigators go out into other classes and spread what they are learning, and it spreads out into other nursing classes and the University.”

—Dr. Mary Ann Stark, professor of nursing

Mekuria

Students taking part as beneficiaries are referred to as scholars. Each week, they meet for typically two to three hours with their navigator—students who are further along in the nursing program.

Taylor Birgy is a fourth-year nursing student who worked as a navigator last year.

“I am a hard-working individual. However, unless you get a support system, the chances to achieve your dreams and reach your goals lessen.”

—Alex Mekuria, nursing student

“I was drawn to be a navigator,” she says. “My role is to be there for my scholar in any capacity. We talk about the assignments, and I offer to edit, or I offer study tips. I am a mentor and am there to offer guidance and support.

“I want to see my scholar succeed. Most of our scholars have a lot going on in their lives, so to have a nursing cheerleader and a peer mentor to relate to, in my opinion, is a wonderful thing.”

Empower Success also is making a difference in the lives of the navigators, as they become attuned to the needs of their fellow students. In fact, Stark says, both navigators and scholars have found the interactions so meaningful that navigators told her this spring they want to get together more often.

“They want to share what they are learning as they go along,” says Stark. “This is an unintended benefit of this program. The navigators go out into other classes and spread what they are learning, and it spreads out into other nursing classes and the University.” ■

[Students aid scientists' hearing-damage research] *Continued from page 7*

And the capacity to take on the job of two different studies, which engaged 200 subjects for four hours each over two sessions, required significant responsibility and endurance. Yet his students, including recent graduate Maddie Smith, exceeded expectations.

"Maddie is the poster child for what an undergraduate research experience can be. Really, she's just shining," he says.

This summer, Smith is working at a U.S. Army medical research center completing the final piece of the project she worked on for two years at WMU.

The work is of critical importance to the Army and to the health of military personnel.

"Models and recommendations are on the table for consideration, which will impact the standards for damage-risk criteria," says Tasko. "In the Veterans Affairs system, hearing loss is a major issue, so the need to develop safe standards is real."

The military is interested in updating standards for noise relative to rifles and artillery. As Tasko explains it, the current model is based on the anatomy and physiology of the ear. As a loud sound enters the ear, the muscles in the middle ear contract reflexively so that less sound passes through the eardrum and on toward the auditory nerve. The nerves are where the damage happens, which can result in noise-induced hearing loss.

"The presumption is that when we hear a loud noise, we engage this reflex system all the time naturally as a protection barrier," Tasko says. "But sound is so quick; the need to anticipate sound—so as to engage this system—is where current research is centered."

The study in his lab is focused on uncovering under what conditions people elicit these contractions in their ears and whether there are ways to preemptively contract the middle ear muscles in anticipation of sound.

"Some tests are conditioning tests, classic conditioning," he says. "If we pair a loud sound with light in the field, can we condition the middle ear muscles to contract? For example, if someone is trained to shoot a gun, then the physical act of pulling the trigger would be a conditioning thing.

"We were testing a lot of different conditions, and undergrads were primary actors involved in the data collection of over 200 subjects. Five days a week, from 9 a.m. to 5 p.m., undergraduate student researchers did the lion's share of the work, work we trained them to do in data collection," Tasko says.

From the student perspective, the experience was invaluable.

"Working with Dr. Tasko and Dr. Flamme in research was, by far, my favorite part of my undergraduate experience," Smith says. "Everything about the experience helped me to grow as a student, a professional and as a person in general.

"My research experience at WMU was a seamless transition into my summer research internship," she continued. "Currently, I am continuing work on the project as a research intern through the Geneva Foundation. We are entering our next phase of data collection for the project."

On a more practical note, she adds, "I do believe that my research experience broadened my choices for graduate school."

This fall, Smith starts a master's degree program in speech-language pathology at the Massachusetts General Hospital Institute of Health Professions. After completing her master's degree, she plans to pursue a doctorate in speech and hearing sciences with a focus on motor-speech disorders.

A subject is being fitted with sensors.

"After I finish my formal education, I hope to be a university professor focused on research and mentorship," Smith says. ■

WMU research drives innovations in mobility

When you think of mobility, the automotive industry may immediately spring to mind. This may be especially true in the Great Lakes state, where "Michigan put the world on wheels" is something of an unofficial motto and a point of pride.

But at WMU, research related to mobility also encompasses solving problems well beyond the automotive industry. Our researchers have a long history of creating innovative solutions that meet the needs of consumers, with a special focus on people who are elderly or who have disabilities.

In 2000, for instance, our researchers were awarded a $4.2 million grant by the National Eye Institute—one of the largest grants ever awarded in the field of orientation and mobility—to investigate ways to help pedestrians who are blind or who have low vision safely navigate complex traffic patterns.

More recently, the U.S. Department of Transportation awarded $4.2 million to WMU to establish a Transportation Research Center for Livable Communities, one of 35 University Transportation Centers across the country.

WMU's center aims to address the nation's critical transportation challenges through the prism of livable communities. Its primary goal is to improve affordable and environmentally sustainable transportation options for conventionally underserved communities, with emphasis on non-motorized travel, pedestrian and bicycle safety, job accessibility and "smart" transport technologies.

At its Spring Convocation in February, the Office of the Vice President for Research showcased innovations to advance interdisciplinary collaborations. The event attracted such guests as Michigan Lt. Gov. Brian Calley and state Sen. Margaret O'Brien.

As the transportation research center's director, Dr. Jun Oh, professor of civil and construction engineering, explains that the center solves problems for a sector that must support an array of people with a broad range of needs.

Though based in our College of Engineering and Applied Sciences, the center brings together experts from disciplines across WMU, including blindness and low-vision studies, computer science, geography, psychology, special education, urban planning, and civil and construction engineering. And our College of Aviation—the only aviation college in Michigan—brings new dimensions to mobility.

Dr. Ron Van Houten, professor of psychology, works on increasing pedestrian safety at unmarked intersections. Dr. Dae Kim, associate professor of blindness and low-vision studies, addresses mobility for people with visual impairments.

Dr. Valerian Kwigizile, associate professor of civil and construction engineering and the center's associate director, sheds light on roadway features that make a difference in creating safe passage for older adults. Dr. Kathleen Baker, professor of geography, models equity of access to public health resources to enable access to multimodal transportation. These and other faculty members at WMU are looking at mobility through a unique lens.

Our experts are busy developing mobility solutions on the national level, but also serving our state. In addition to the U.S. Department of Transportation, the Michigan Department of Transportation is a partner in supporting our mobility research; projects include accelerated bridge construction, intelligent transportation system development and pedestrian crossings.

By providing this unique edge to addressing mobility challenges, WMU's world-renowned faculty members continue to serve societal needs and find solutions to problems in a truly collaborative and interdisciplinary fashion. And, as an educational institution, we are training the next generation of professionals to tackle transportation-related challenges—safely, efficiently and affordably—in an increasingly complex world. ■

Obare

By Dr. Sherine Obare, associate vice president for research

Forget the apple pie Meat is the American way

And the potency of this popular source of protein goes well beyond the plate, history Professor Wilson J. Warren explains in his new book.

Listen to the sizzle of the steak as it hits the hot grill, the smell of seared meat wafting to your nostrils, then slide the tasty treat onto your outstretched plate.

Bite into a burger—everyone's favorite—sandwiched between crisp lettuce and a fat slice of juicy tomato. Attend a ballgame, and surely there's a hot dog in your hand, slathered in ketchup and mustard, buried in relish.

Hungry yet?

Meat—it's the American way. From strips of bacon beside morning eggs to pork chops piled on dinner platters across the land, Americans have been eating meat with every meal since the 19th century, when meat was associated with wealth and health, and both government and science supported it.

In his latest book, "Meat Makes People Powerful: A Global History of the Modern Era," Dr. Wilson J. Warren, history professor, explores the hold meat has over not only Americans, but increasingly nations across the world.

The potency of this popular source of protein goes well beyond the plate. Warren had his first inklings of this early, long before he became a researcher. He grew up in Iowa in the shadows of meat-packing plants that had been in operation since the 1850s.

"In fact, I wrote my senior thesis on the meat industry—I have a Ph.D. in labor union history. It's always been an interest—you could say I wear two hats, labor historian and teacher," says Warren, who is chair of WMU's history department.

There never seemed to be much doubt that people should eat meat, he says. Concerns were only how to make it safer and more available.

"It's only recently that we have started to re-evaluate this."

Behind the burger

Warren's book discusses the impact meat has had not only on our health, but on the health of the planet. Large-scale factory farming, he writes, has had an enormous impact on our environment.

Wastewater leaks into large lagoons have been an ongoing problem around confinement pig farms, while cattle have been shown to be methane gas producers. In that respect, he says, poultry produces the least pollution. And no matter what the source, slaughterhouses have brought up concerns of unnecessary cruelty while employing illegal immigrants as cheap labor.

"I've lived in Kyoto, Japan, and I've seen how American marketing has changed the Asian diet," Warren says. As national governments have regulated meat production, a more Westernized diet has been accepted in East Asia. People have gotten taller but also more obese. We're seeing the same problems in India as people there are eating more meat, and in Brazil, rain forests are being destroyed to make room for raising livestock."

Recent trends in the United States, Warren says, point toward a growing interest in buying less meat and only that which is humanely raised. People are turning to small farmers.

"Yet we can't always know how small farmers are raising their livestock," Warren warns. "They may be using the same slaughterhouse practices."

While there is no one solution for the various issues involving the meat industry, Warren makes one recommendation: moderation.

He, too, enjoys that steak on his plate, but rather than making meat the primary dietary feature, he says enjoying meat twice a week rather than with every meal may be healthier for you—and the planet we live on. ■

Our Lady of the Prairie

(Houghton Mifflin Harcourt, 2018)

In "Our Lady of the Prairie," Thisbe Nissen has brought her readers a sharp and bitingly funny novel about a professor whose "calm-ish" Midwestern life gives way to a vortex of crises—and her attempts to salvage the pieces without going to pieces herself. In the space of a few torrid months on the Iowa prairie, Phillipa Maakestad—long-married theater professor and mother of an unstable daughter—grapples with a life turned upside down. After falling headlong into a passionate affair during a semester spent teaching in Ohio, Phillipa returns home to Iowa for her daughter Ginny's wedding. There, Phillipa must endure (among other things) a wedding-day tornado, a menace of a mother-in-law who may or may not have been a Nazi collaborator, and the tragicomic revenge fantasies of her heretofore docile husband.

Nissen, an associate professor English at WMU, is the author of two other novels, "The Good People of New York" and "Osprey Island." ■

TechnoRage

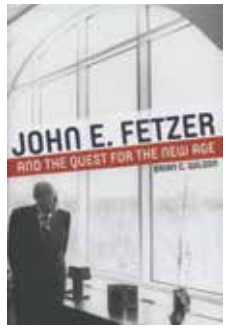
(TriQuarterly Books/Northwestern University Press, 2017)

Dr. William Olsen's "TechnoRage" is a meditative ode to nature. Its intensely lyrical poems remind us of our humanity, spinning free-ranging poetic conversations that question the ways of the world. In the age of the wide but often shallow lens of our new technology, Olsen takes a nod from Robert Frost and Gary Snyder, laying bare our need to return to the roots of things, where these poems find their voice. He revels in language that is an intensely authentic rumination on human isolation.

Olsen is a professor of English, teaching creative writing and literature. He also is the author of five poetry collections, including "The Hand of God" and a "Few Bright Flowers." ■

John E. Fetzer and the Quest for the New Age

(Wayne State University Press, 2018)



Part of a Great Lakes Book Series, Dr. Brian C. Wilson's latest book follows the spiritual sojourn of John E. Fetzer, a Michigan business tycoon born in 1901 who lived most of his life in Kalamazoo. Fetzer parlayed his first radio station into extensive holdings in broadcasting and other enterprises. By the time he died in 1991, Fetzer had been listed in *Forbes* magazine as one of the 400 wealthiest people in America.

Wilson is a professor of comparative religion. His previous books include "Dr. John Harvey Kellogg and the Religion of Biologic Living" and "Yankees in Michigan." ■

Drugs to combat stroke and brain injuries rise from 1980s research

A failed Upjohn Co. research effort from the 1980s, which sought to regenerate damaged brain cells and named for the biblical figure Lazarus, has led to the resurrection of another Upjohn drug and the prospect of a new tool to treat victims of stroke and brain injuries.

This development has been made possible due to the commercialization efforts of WMU's Biosciences Research and Commercialization Center.

That resurrection illustrates the lingering impact of the life sciences infrastructure in Kalamazoo and WMU, much of which has been built around the scientists who are part of the Upjohn legacy.

Members of the team who spent years developing the failed "lazaroid" drugs for Upjohn came back together to focus their research expertise on another Upjohn discovery—glyburide, which originally was marketed as an anti-diabetes treatment.

Their work, done with financial support from WMU's BRCC, has resulted in a promising new treatment called Cirara that was sold in 2017 by drug startup Remedy Pharmaceuticals to Biogen for $120 million. Well along in development, the drug is now slated for final clinical trials.

Haakenson

"Glyburide (Cirara) is a drug that was initially developed in Michigan and through the use of Michigan talent is now going to be repurposed to provide greater benefits," says Steve Haakenson, executive director of WMU's BRCC, which invested $250,000 in the development effort.

"The financial returns from BRCC's early stage investment in Remedy and other recent successes prove that we have a working process for finding and identifying life sciences startup companies that will drive economic growth while also bettering lives."

The BRCC was established by the Michigan Legislature in 2003 to provide startup and gap funding to Michigan-based life sciences ventures as they neared the commercialization phase. This helps a life sciences firm develop while hopefully delivering financial rewards to the University when a company or technology succeeds or is sold.

Dr. Jack Luderer, longtime Kalamazoo-based drug development scientist and former director of the BRCC, was one of the original lazaroid project team members at Upjohn. Ed Hall, Gene Means and John McCall were other Upjohn scientists on the project.

"Glyburide (Cirara) is a drug that was initially developed in Michigan and through the use of Michigan talent is now going to be repurposed to provide greater benefits."

—Steve Haakenson

When Remedy was interested in resurrecting and repurposing glyburide to treat brain swelling and resulting injury, the company contacted Gene Means, who in turn reached out to his old colleague Luderer.

Together, they helped set up Phase I trials in Kalamazoo, using the Jasper Clinic and their own expertise from testing the lazaroids. Luderer's ties to the BRCC also provided an opportunity for funding to move the drug development forward.

Remedy CEO Sven Jacobson says jump-starting Cirara with the phase I study depended on the expertise of the Upjohn veterans.

"Knowing what doesn't work in any endeavor is just as important as knowing what does work," he explains. "Both Dr. Means and Dr. Luderer had a great deal of knowledge in both respects. Many parts of the lazaroid development plan were excellently implemented, and I wanted to learn from that.

"Similarly, the field at the time of the lazaroid studies was not as sophisticated in terms of trial design as it is now. Knowing some of the pitfalls in that regard was instructional and actually incredibly valuable," Jacobson adds. "They also had a great network of ex-colleagues, some of whom consulted to Remedy along the way."

Luderer says the strength of Upjohn's research and development—gone in name but still percolating in startups begun by ex-Upjohn scientists at the WMU Homer Stryker M.D. School of Medicine's Innovation Center—resonates even now, setting the path for new treatments like Cirara.

"That's kind of the bedrock of what science is: One group contributes, and another group stands on their shoulders and makes another one," Luderer explains.

"For those who select careers in drug development, you understand that ultimately most of your drug leads fail. I've worked on many more failures than successes. That's the way the science moves forward. You have to think about what makes these kinds of things possible in the first place. Looking at the legacy of Upjohn and Kalamazoo, it's the people. It's the talent." ■

Another Way to See the World

The dividends of crossing borders

The address changes in Dr. Susan Pozo's life are pretty exotic: New York City, Dominican Republic, Uruguay, Taiwan, Venezuela.

She was born in the states, but her mother was a Dominican immigrant and her father was raised in Uruguay. As a result of her experiences, she calls herself a "third culture kid." That means she has spent at least one year in a culture other than her parents' passport country.

"You're not really living in your parents' culture; you're not fully immersed where you live, so you form a culture of your own," she says. "I call such people international-human-capital-enhanced individuals."

Pozo is a professor of economics, and her knowledge of other places has become an important part of her research résumé—and her view on the world. She studies international finance and migration, including exploring the economic value and other benefits associated with having international experience—benefits for the individual and for the "foreign" land in which a non-native resides.

She also has an affinity for investigating economic phenomena that are often difficult to measure.

Pozo's research on the dividends of crossing borders may be a particularly timely topic to explore today in view of contemporary and heightened tensions surrounding migration in the United States and in parts of Europe.

At a time when immigration is a hot topic, Pozo says that there is an alarming lack of understanding and holding onto myths about immigrants.

"I've studied illegal immigration—the policies currently being promoted won't work. People will always find other ways in desperate circumstances. Policies about separating families will increase foster kids in our society, a population of disassociated people. Yet, when you are allowed to assimilate naturally, many of these problems are eliminated."

In her research on measuring returns on living abroad, the economist has been interested in proving causality—that is, why and how international experience adds value and impact on wages.

In part using results of the national census, Pozo divided her research groups into those who were not self-selected—such as children of military parents—who were born abroad by chance, and those who made a conscious choice to live abroad. She then calculated their earnings to see how they might compare to those who have never lived abroad.

"I found higher earnings overall among those who have lived abroad, but especially so among women," Pozo says. "It held true across different professions, but the highest premiums were in managerial and professional areas. People earned more, especially in those careers in which communication is an important factor."

Pozo is still researching the mechanisms by which this happens. Possibilities, she says, are cognitive advantages as new experiences develop more neural connections, as does learning a second language.

"Language seems to have a positive effect, yet I saw the same results with people who have lived abroad in the United Kingdom, where English is still the predominant language," Pozo says. "It gets tricky. Has international experience made people more productive or are they self-selected risk-takers, because it can be scary moving to another country? Are we getting the best and brightest, or is knowing more than one culture the advantage?"

Pozo believes that living abroad also fosters creativity and strengthens one's out-of-the-box thinking capacity. Creative thinkers find new and different ways to solve problems and communicate with others.

"I was traveling abroad with my family, and we sat down for a meal in a restaurant with menus in a language none of us understood," Pozo recalls.

She saw a different way to solve their problem. "While the rest of the family was willing to just point something out on the menu and wing it, I decided to ask other diners who were enjoying wonderful meals to point them out on the menu."

Pozo says her experience abroad had her use a problem-solving attitude while her dining companions had no idea what to do.

This is a small example, but with broader application, that problem-solving ability strengthened by a habit of out-of-the-box thinking may be beneficial in any number of life circumstances. ■

She keeps you *flying*

Simi Razvi, an aircraft mechanic for American Airlines, became fascinated with aircraft systems at WMU's College of Aviation. She initially planned to pursue piloting. "Flying is great," she says, "but I love taking stuff apart and looking at how it works and putting it back together. That's where all the action is."

In the aviation tech world, landing a job at a major airline is a major feat.

This is where airframe and powerplant mechanics get to work on the "big birds," performing such critical jobs as overhauling engines, examining the structural integrity of jets and maintaining electrical systems.

Simi Razvi, a 2013 College of Aviation graduate, is not only working for one of the world's best-known air carriers—American Airlines—she was hired by the company just one year after graduating from WMU.

She may meekly suggest that "everything just fell into place," but the 27-year-old concedes that it took skill, determination and networking to reach such heights so quickly.

"Make yourself marketable," is her frequent advice to up-and-comers. "Be a part of student organizations and meet managers from airlines or aviation companies."

Today, Razvi spends her nights at Ronald Reagan Washington National Airport in Arlington, Virginia, working as an aircraft technician. But she is not someone who had long dreamed of a career in aviation.

She grew up in Detroit, enjoyed a typical childhood, but didn't have typical schooling.

"I was fortunate. When it came time for high school, I attended Davis Aerospace Technical High School, which was located at the Coleman A. Young International Airport in Detroit," she says.

She attended the Detroit public school focused on flight training and aviation technology not for its aerospace curriculum, but because her older siblings had attended. Once there, however, "it was hard not to get hooked. The more I learned about aviation, the more I wanted to make a career out of it."

After graduating in 2009, she headed for WMU's College of Aviation.

"It seemed like the aviation institution to go to. I knew people from previous years who had graduated, went to Western and boasted about the program. I felt at home. It wasn't too big, and it wasn't too small," she says.

And she was impressed by the college's top-of-the-line Cirrus SR-20 aircraft fleet and the various engines in the power plant lab.

Razvi's original plan was to pursue a career in piloting, but she found herself more drawn to the aviation technical operations program with its array of complex machinery and aircraft systems.

"Flying is great, but I love taking stuff apart and looking at how it works and putting it back together," she says. "That's where all the action is."

In the program, she developed close ties with faculty, particularly Jeremy Hierholzer and Dr. Gail Rouscher.

"Jeremy's classes were far from boring and very hands-on," Razvi says. "He taught from a real-world standpoint, which really helped me understand the material better and apply it to my career. He also helped me get into Virginia Tech's Master of Information Technology program.

"Gail took the time to help me improve my riveting techniques, especially countersinking rivets. I remember being frustrated a few times, and she was always there to help."

Active with aviation student groups, Razvi was as highly engaged in co-curricular experiences as she was in the classroom, and through associated activities, developed an appreciation for the important role networking plays in learning the aviation industry and in potentially securing employment.

"I didn't want to scoot by doing the bare minimum," she says. "I wanted to be a part of the aviation community and to make a difference. Some of the best advice I can give to future aviation students is to be a part of at least one aviation student organization at WMU.

"My favorite memory at WMU is when I was in the Professional Aviation Maintenance Association and we took a tour of Detroit Metro Airport's Delta TechOps facility," she recalls. "It led to me completing an internship in the fall and helped get my foot in the door of a major airline."

She also took advantage of hands-on learning opportunities as an intern at Duncan Aviation, a division of which is a few miles southwest of WMU's College of Aviation campus in Battle Creek, Michigan. Pretty quickly, her networking and knowing the right people paid off. She moved into the Big Leagues, becoming an aircraft mechanic at American Airlines.

"I get to learn new things every day," she says. "Every aircraft that comes in can have a completely different problem than the last, but the fun part is trying to figure it out."

Her next goal is to move into management.

"As a lead mechanic, I have made a lot of changes and improvements to our operation to the point where our director of maintenance noticed. He encouraged me to apply for the next supervisor position," she says.

Decades of Design

New archival collection offers a retrospective on graphic design before the digital revolution

Housed in WMU's Zhang Legacy Collections Center is a tantalizing new collection of graphic design work that has been assembled and curated by two graduates of the University's 40-year-old graphic design program.

Barbara Loveland and Linda Powell met as graphic design students before moving on to successful careers working as designers for the Herman Miller furniture company in Zeeland, Michigan, then on to Ferris State University, where they developed a baccalaureate degree program in graphic design.

The two had been collecting various graphic design artifacts through the years and kept in touch with Jon Henderson, who started WMU's design center in the 1970s.

The body of work they have collected, known as the West Michigan Graphic Design Archives, contains a variety of flyers, annual reports, posters, brochures, publications, notices and event announcements—many of which Loveland and Powell had a hand in creating as students.

"This is really a rich history of WMU, its departments and events," says Lynn Houghton, regional history curator in the Zhang Legacy Collections Center.

"It has tremendous potential."

The designers say their collection serves as a source for business leaders, educators, faculty members, professional designers and students to expand their thinking about potential solutions for communication problems and how design has worked in society.

"From these pieces, people can look to see how the use of type, color and imagery—photographic or illustrative—come together in a unique way to communicate a particular message," Powell says.

Loveland adds that, "Graphic design has changed so radically over these past few years that we think it is essential to preserve the work that marks our heritage. Much can be learned from successful graphic design work from the past."

Pieces in the collection were completed prior to when the advent of personal computers and software programs dramatically transformed the graphic design process.

They chose the Zhang Archives Collection Center, home to the WMU Archives and Regional History Collections, for its state-of-the-art archival system.

The center, completed in 2013, draws professional and amateur researchers from WMU's local community, from across the state and beyond. Collections support the research and teaching mission of the University and the needs of historical and genealogical researchers. While the materials have local origins, many of the collections have broader themes and historical significance beyond the southwest Michigan region.

"The mission at Zhang is parallel to ours," Powell says. "Kalamazoo is a central location for West Michigan, making it accessible for seeing in person the actual archival pieces. The University community provides an environment that enforces the academic nature of our collection."

The collection includes historical materials from WMU, Herman Miller and the French Paper Company, a paper mill in Niles, Michigan. It is a growing collection, and people and companies such as Newell are donating and using the collection to teach effective design, marketing and communication concepts.

The West Michigan Graphic Design Archives may be viewed in person at the Zhang Center or online at graphicdesignarchives.org. ■

"The mission at Zhang is parallel to ours. Kalamazoo is a central location for West Michigan, making it accessible for seeing in person the actual archival pieces. The University community provides an environment that enforces the academic nature of our collection."

—Linda Powell, co-creator of the West Michigan Graphic Design Archive

Linda Powell, left, listens in agreement as Barbara Loveland speaks passionately about the body of work they have collected.

Peace Corps Tenth Anniversary Poster

Date 1971

Designer:
Patrick Koeller

Creative Director:
Jon Henderson

Firm:
WMU Design Research Center

Recognition:
Peace Corps Poster Design Contest Prize Winner

Copyright:
Western Michigan University

Live Safe/Save Life Poster

1975

Designer:
Len Adams

Firm:
WMU Design Research Center

Recognition:
Design in Michigan 1967-1977

Copyright:
Not Specified

One Flew Over the Cuckoo's Nest Theatre Poster

1974

Designer:
Tom Pitcock

Creative Director:
Jon Henderson

Firm:
WMU Design Research Center

Copyright:
Western Michigan University

College of General Studies Program Flier and envelope

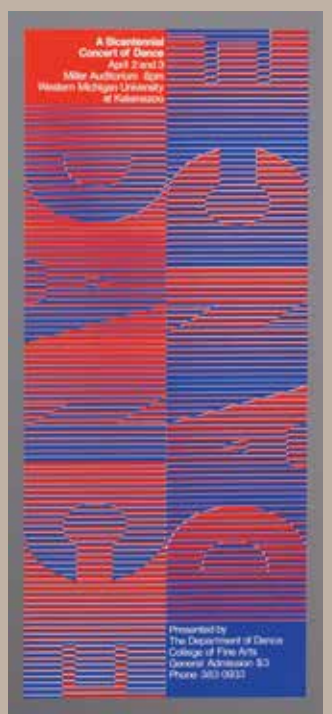
1978

Designer:
Barbara Loveland

Creative Director:
Barbara Loveland

Firm:
WMU Design Research Center

Copyright:
Western Michigan University



Bicenntenial Concert Of Dance Poster

1976

Designers:
Barbara Loveland, Diane Benoit

Creative Director:
Barbara Loveland

Firm:
WMU Design Research Center

Recognition:
Women in Design 1978

Copyright:
Western Michigan University

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Housed in the Zhang Legacy Collections Center, a tantalizing collection of graphic design work has been assembled and curated by two graduates of the University's 40-year-old design program. The collection offers a retrospective on graphic design before the digital age.